Individuals with a likely history of elevated exposure to 1 or more of thousands of manufactured chemicals known collectively as perfluoroalkyl and polyfluoroalkyl substances (PFAS)—sometimes called “forever chemicals”—should be offered blood testing to determine their exposure level, which may indicate that they face health issues associated with these substances, according to a new report.

These chemicals are found in a range of products (eg, nonstick cookware, stain-resistant fabric, firefighting foams) because they repel oil and water, reduce friction, and resist temperature changes, notes the report, written by a committee of experts for the National Academies of Sciences, Engineering, and Medicine (NASEM). These “forever chemicals” are also resistant to degradation—and when they do break down, the result is 1 or more other PFAS, some of which can persist in the body and in the environment.

Individuals can be exposed to PFAS in the workplace or from living in certain areas, such as near facilities that use or have used fluorochemicals, commercial airports, military bases, wastewater treatment plants, farms where sewage sludge may have been used, or landfills or incinerators that have received waste containing PFAS. Some level of PFAS contamination has been documented in an estimated 2854 locations throughout the US.

“Although not all of the contamination represents exceedances of health advisories, the pervasiveness of the contamination is alarming,” the report says. “Furthermore, almost 100 percent of the US population is exposed to at least one PFAS.”

Evidence suggests that PFAS exposure is associated with an increased risk of a blunted antibody response, abnormally high cholesterol levels, decreased infant and fetal growth, and an increased risk of kidney cancer, the report says. There is also limited or suggestive evidence that PFAS exposure is associated with increased risk of breast and testicular cancers, pregnancy-induced hypertension, thyroid disease, and ulcerative colitis.

In occupational settings, people most commonly are exposed to PFAS through inhalation, and inhalation also is a route of exposure for people who live near fluorochemical plants or incinerators. In nonoccupational settings, PFAS exposure is most likely through drinking contaminated water and eating produce, fish, wildlife, meat, or dairy products tainted through association with contaminated soil, water, or dust. PFAS can transfer to the fetus during pregnancy or to infants through breastfeeding or consumption of formula made with contaminated water. Food also may be contaminated by packaging that contains materials containing PFAS, such as microwave popcorn bags or the packaging used for fast foods or processed foods.

The report focuses on 7 PFAS that are currently monitored by the Centers for Disease Control and Prevention (CDC).

In June, the Environmental Protection Agency issued updated advisories for 2 of these PFAS—perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS)—that replace advisories that the EPA issued in 2016, as well as new advisories for 2 other PFAS. The agency noted that the updated levels indicate that “some negative health effects may occur with concentrations of PFOA or PFOS in water that are near zero and below EPA’s ability to detect at this time.”

The NASEM report said when patients ask for advice to reduce their exposure to PFAS, clinicians should talk with them to determine if and how they might be exposed to the chemicals. Patients with
possible occupational exposure should be advised to consult with occupational health and safety professionals about reducing exposure.

Clinicians also should advise patients with elevated PFAS levels in their drinking water to reduce their exposure by filtering their water, the report says, highlighting an online database created by NSF (formerly called the National Sanitation Foundation) to help patients find suitable filters. Patients residing in areas with known PFAS contamination should also be counseled that these substances may be present in local fish, wildlife, meat, and dairy, and clinicians should advise parents of infants about steps that can be taken to lower PFAS exposure through feeding.

The report calls on the CDC’s Agency for Toxic Substances and Disease Registry (ATSDR) to update its clinical guidance for PFAS and blood testing to reflect the NASEM committee’s findings. This includes offering PFAS blood testing to patients likely to have a history of elevated exposure from the workplace or from living in communities likely to be affected.

As affected communities are identified, government entities such as the CDC, ATSDR, and public health departments should offer educational materials to support clinicians, notes the committee. These materials should include information about how people can be exposed to PFAS, potential health effects of PFAS exposure, strategies for reducing exposure, and the limitations of blood testing (such as it only tests for a limited selection of PFAS and assesses the level of PFAS in the blood only at the time the sample was collected).

In addition, all such conversations with patients should include a discussion of the potential benefits and harms of PFAS testing and the possible clinical consequences (such as additional follow-up), “so patient and clinician can make a shared, informed decision.”

The committee also said that clinicians should use the sum of the serum or plasma concentrations of the 7 PFAS monitored by the CDC to inform clinical care of exposed patients, noting that patients with levels of less than 2 nanograms per milliliter (ng/mL) are not expected to experience adverse health effects. Patients found to have levels associated with an increased risk of adverse health consequences should be encouraged to reduce their exposure (especially those who are pregnant) if a source has been identified, as well as receive regular screenings and monitoring for these effects.

For example, following the usual standard of care, for patients with PFAS levels ranging from 2 ng/mL to 20 ng/mL, clinicians should prioritize screening for high blood cholesterol and other lipids once between 9 and 11 years of age and once every 4 to 6 years after age 20 years, screen for hypertensive disorders of pregnancy at all prenatal visits, and screen for breast cancer according to clinical practice guidelines based on age and other risk factors.

Patients with PFAS levels greater than 20 ng/mL may face higher health risks, and screening for patients older than 2 years for high blood cholesterol and other lipids should be prioritized. In addition to the care advised for patients with elevated PFAS levels from 2 ng/mL to 20 ng/mL, at all well visits, those with PFAS levels exceeding 20 mg/mL should receive thyroid function testing (for patients older than 18 years) and undergo assessment for signs and symptoms of kidney cancer (for patients older than 45 years) as well as for testicular cancer and ulcerative colitis (for those older than 15 years).

If and when the clinician and patient opt for testing, the clinician should order PFAS serum or plasma testing “from a laboratory that meets standards that support quality and integrity of results,” the report says. However, few laboratories currently have the capability to test for PFAS.

“Given widespread PFAS exposure and the putative health effects associated with these chemicals, public health authorities would do well to prioritize addressing these barriers,” the report notes, adding that laboratories performing PFAS testing should report the results to state public health authorities to improve PFAS exposure surveillance.